

US008064650B2

(12) **United States Patent**
Webb

(10) **Patent No.:** **US 8,064,650 B2**
(45) **Date of Patent:** ***Nov. 22, 2011**

(54) **FILE MANAGEMENT OF DIGITAL IMAGES USING THE NAMES OF PEOPLE IDENTIFIED IN THE IMAGES**

(75) Inventor: **Steven L. Webb**, Loveland, CO (US)

(73) Assignee: **Hewlett-Packard Development Company, L.P.**, Houston, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2011 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/192,922**

(22) Filed: **Jul. 10, 2002**

(65) **Prior Publication Data**

US 2004/0008906 A1 Jan. 15, 2004

(51) **Int. Cl.**
G06K 9/00 (2006.01)

(52) **U.S. Cl.** **382/118**

(58) **Field of Classification Search** 382/305,
382/118

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,164,992 A 11/1992 Turk et al.
6,038,333 A * 3/2000 Wang 382/118

6,141,048	A *	10/2000	Meyers	.....	348/294
6,184,926	B1	2/2001	Khosravi et al.		
6,549,913	B1 *	4/2003	Murakawa	.....	1/1
6,606,398	B2 *	8/2003	Cooper	.....	382/118
6,711,587	B1 *	3/2004	Dufaux	.....	1/1
6,721,001	B1 *	4/2004	Berstis	.....	348/231.3
7,843,495	B2 *	11/2010	Aas et al.	.....	348/231.3
2001/0040986	A1 *	11/2001	Farrington et al.	.....	382/118
2002/0002586	A1 *	1/2002	Rafal et al.	.....	709/205
2002/0067856	A1 *	6/2002	Fujii et al.	.....	382/218
2004/0008258	A1 *	1/2004	Aas et al.	.....	348/207.1
2004/0243671	A9 *	12/2004	Needham et al.	.....	709/204

OTHER PUBLICATIONS

Satoh et al., Name-It: Naming and Detecting Faces in News Videos, Jan.-Mar. 1999, IEEE Multimedia, vol. 6, Issue: 1, pp. 22-35.*

Bederson, PhotoMesa: A Zoomable Image Browser Using Quantum Treemaps and Bubblemaps, 2001, ACM, pp. 71-80.*

* cited by examiner

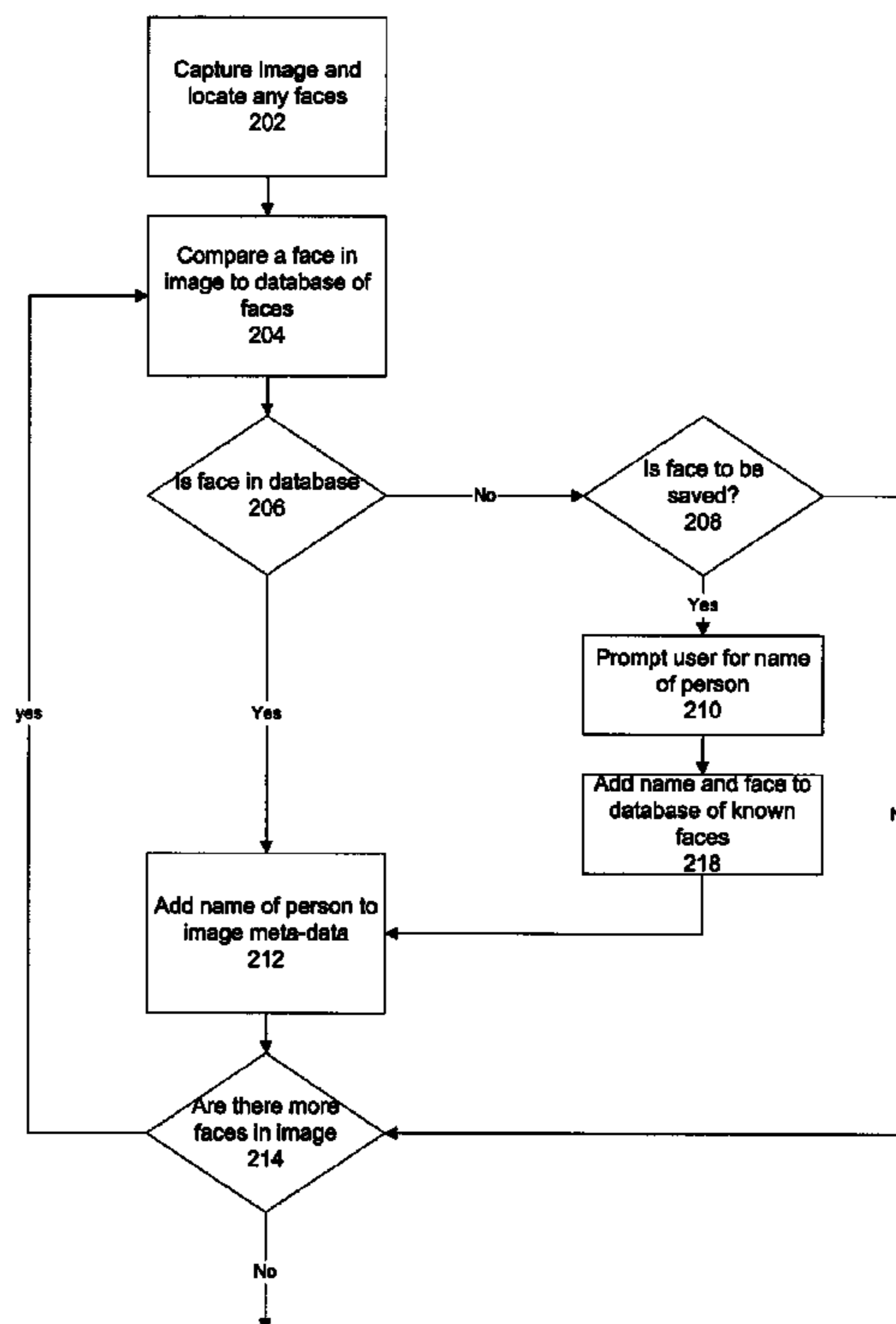
Primary Examiner — Matthew Bella

Assistant Examiner — Dennis Rosario

(57) **ABSTRACT**

A method and apparatus for organizing digital images that contain a persons face is disclosed. A database of known faces allows the faces in the images to be identified. The names of the people identified in the image are used in naming the image files and in naming the path to the image files.

6 Claims, 4 Drawing Sheets



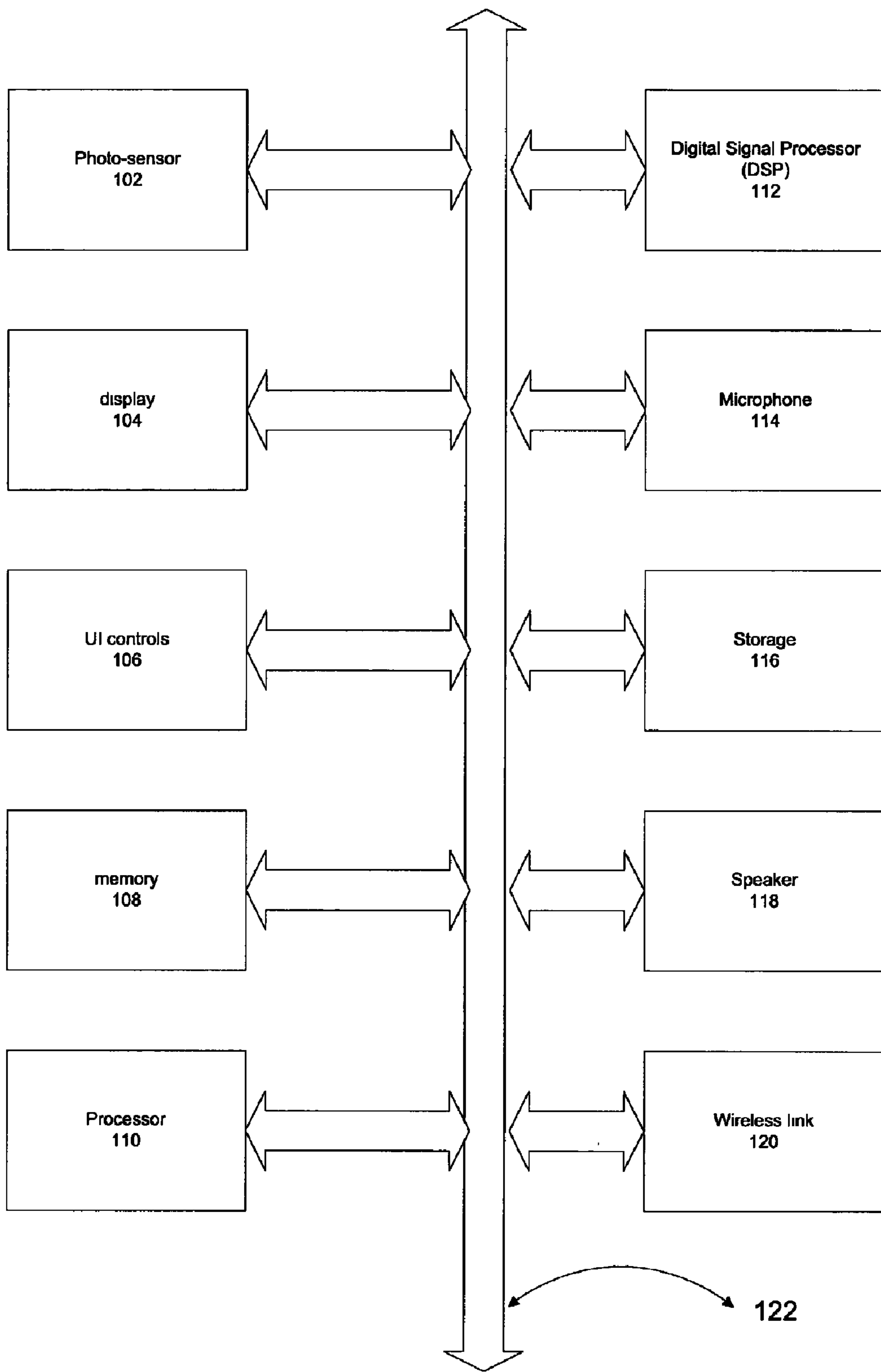


Figure 1

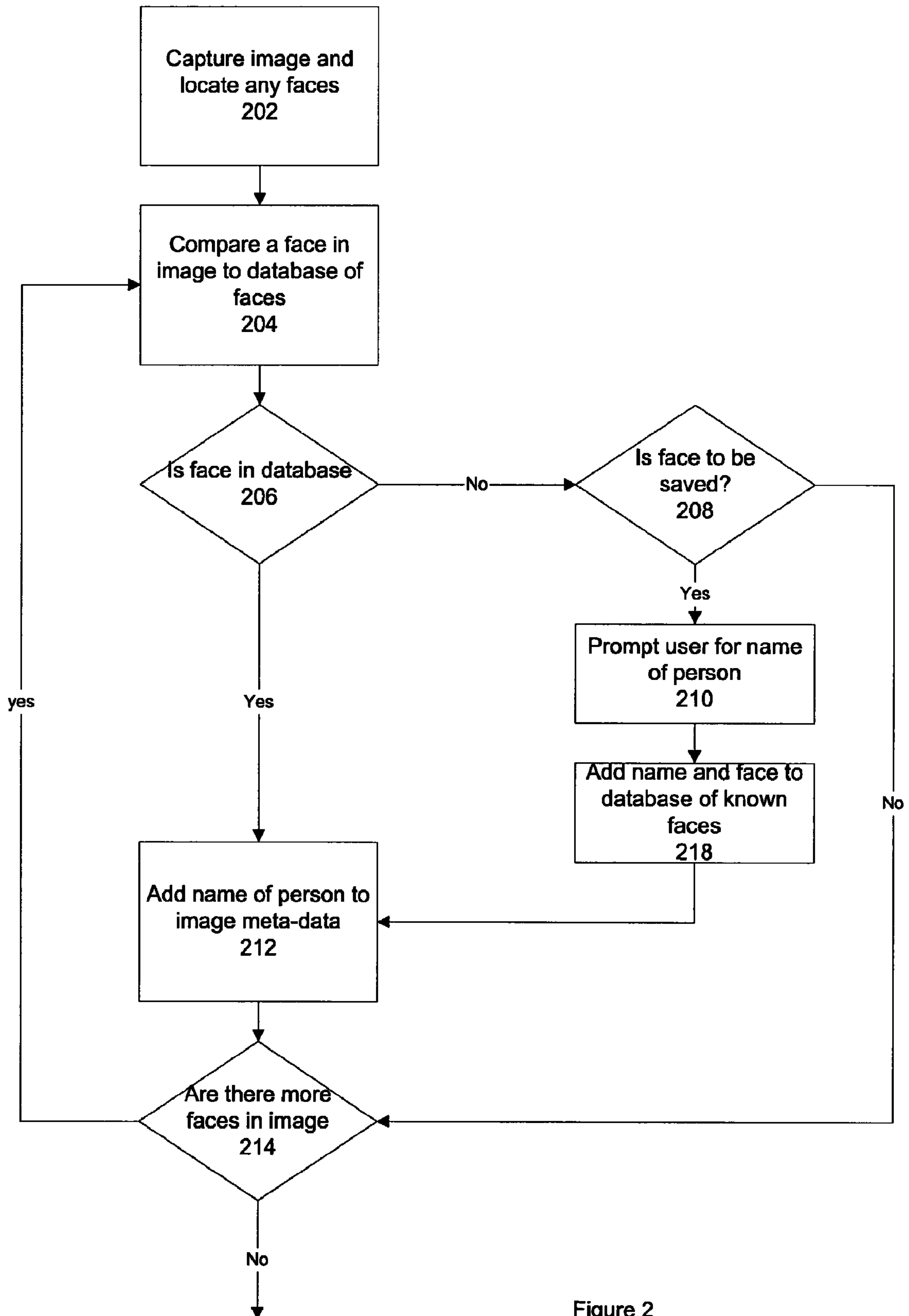


Figure 2

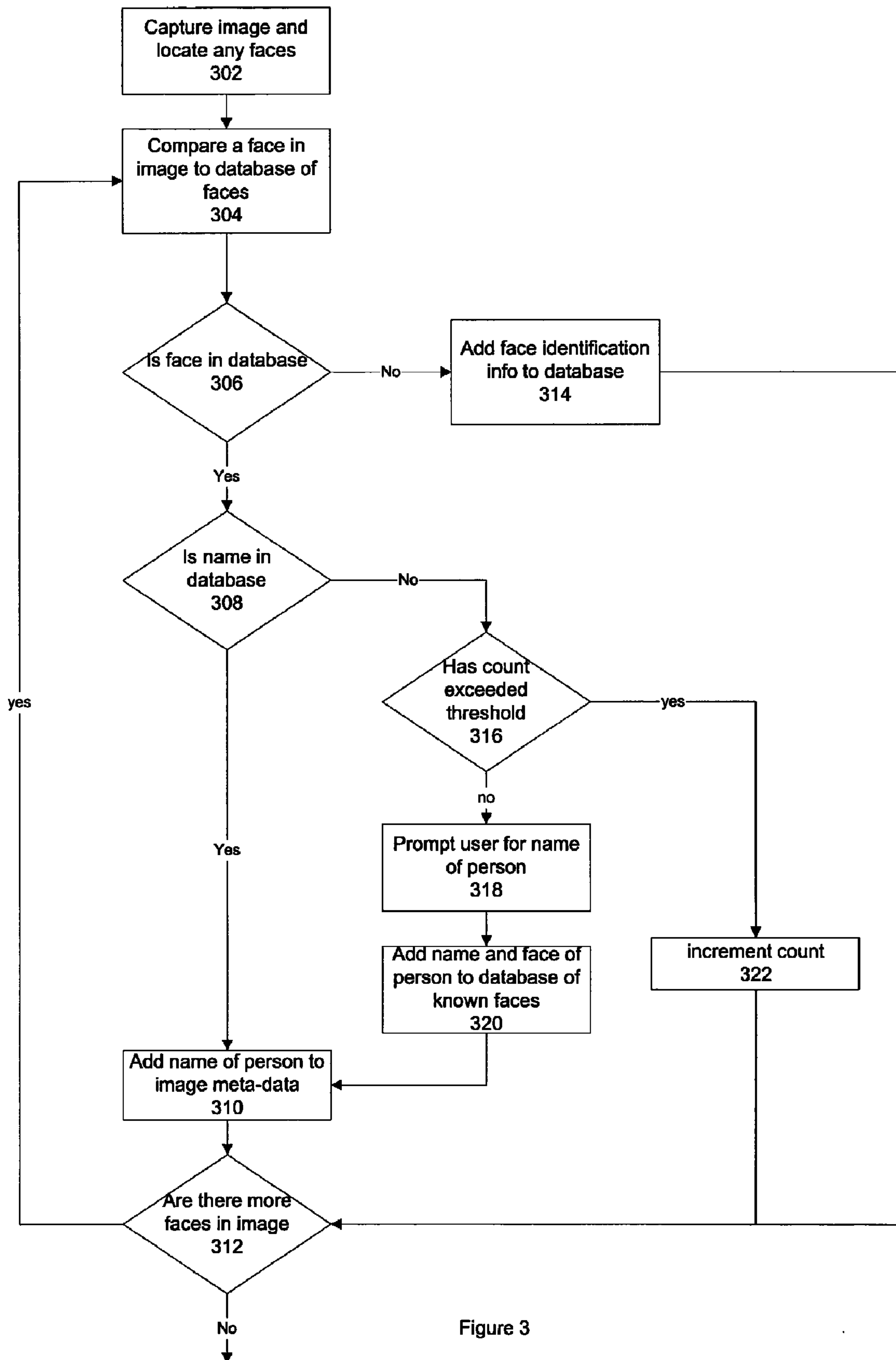


Figure 3

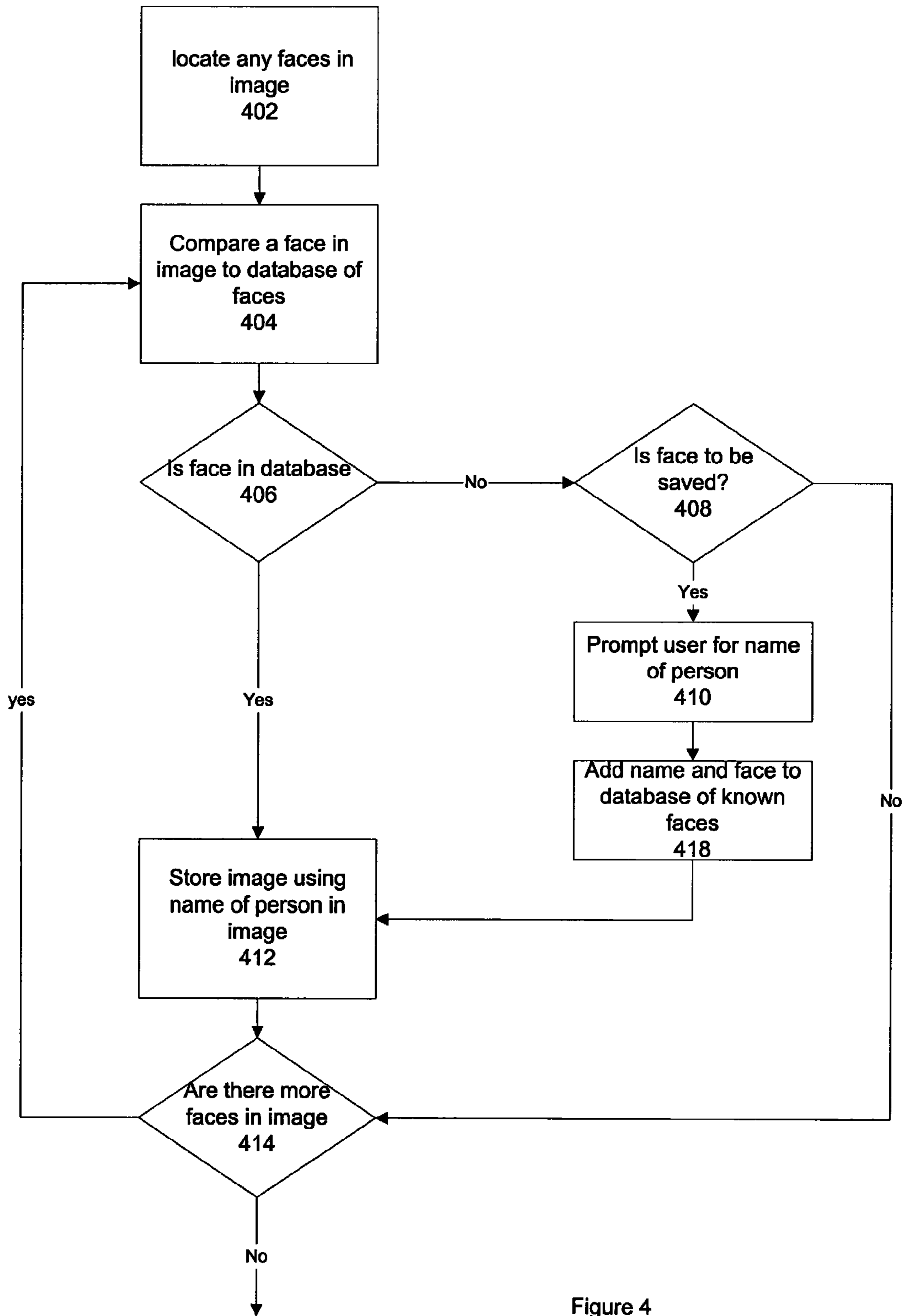


Figure 4

1**FILE MANAGEMENT OF DIGITAL IMAGES
USING THE NAMES OF PEOPLE
IDENTIFIED IN THE IMAGES**

RELATED APPLICATIONS

This application is related to the application "Face recognition in a digital imaging system accessing a database of people" that was filed on the same day as this application and issued as U.S. Pat. No. 7,843,495 on Nov. 30, 2010.

FIELD OF THE INVENTION

The field of this invention relates to digital imaging and more specifically to using the names of the people identified in the digital images to store and organize the images.

BACKGROUND OF THE INVENTION

Digital cameras create a large number of files. These files can be audio files, thumbnails or full digital images. Currently these files are named based on a default name given by the camera manufacture, for example DSC00001.jpg. Most digital cameras today can store a large number of these images. After taking pictures the user is presented with a list of these files with names that have no meaning to the user, for example DSC00001.jpg, DSC00002.jpg, DSC00003.jpg, DSC00004.jpg etc. When the user wants to share, print, or display a particular image, the user has to open and look at each file until the desired image is located.

Some cameras allow the user to rename the file but with the limited user interface available on most digital cameras, renaming the file is difficult and time consuming.

There is a need for a digital imaging system that can name the image files with a name or path that can help the user locate and organize the images that have been captured.

SUMMARY OF THE INVENTION

A digital imaging system that can create and maintain a database of people contained in images captured by the digital imaging system can simplify the identification of people in images. The digital imaging system uses the names of the people identified in the captured images to name the captured image file or to name the path to the captured image file.

Other aspects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a digital imaging system in accordance with an example embodiment of the present invention.

FIG. 2 is a flow chart for creating a database of faces contained in images in accordance with an example embodiment of the present invention.

FIG. 3 is a flow chart for creating a database of faces contained in images in another example embodiment of the present invention.

FIG. 4 is a flow chart for storing images using the names of people contained in images in an example embodiment of the present invention.

2**DETAILED DESCRIPTION OF THE PREFERRED
EMBODIMENT**

A system that can build a database of people captured in images taken by a digital device can facilitate the organization and management of those images.

Today there are a number of methods that can be used to detect a human face inside a digital image. U.S. Pat. No. 6,184,926 B1 "System and method for detecting a human face in uncontrolled environments" is one example and is hereby included by reference for all that it teaches. Once a human face has been identified inside a digital image, information about that face can be extracted such that the face can be identified in other images. For example U.S. Pat. No. 5,164,992 "Face recognition system", hereby included by reference, can compare faces in digital images to a set of reference faces to determine if any of the reference faces are present in the digital image.

Digital cameras today typically contain a photo-sensor (102) for capturing images; a display area (104) for displaying the captured images and controlling the digital camera; a storage area (116) for storing the captured images; memory (108), for temporary manipulation of the captured images and for running the firmware of the camera; a processor (110) for running the camera and some type of user interface (UI) controls (106). Some digital cameras also include a microphone (114) for capturing audio clips along with the digital images. Some digital cameras include a speaker (118) and a digital signal processor (DSP 112). The UI controls (106) on digital cameras may include physical controls like buttons, rocker switches, and a keyboard, and virtual controls shown in the display area. The digital images, video clips and audio clips captured by the digital camera may be stored in memory (108) or may be moved to the storage area (116). Today the memory and the storage area are typically different types of devices. The memory is typically fast volatile memory and the storage area is typically slower non-volatile memory. In the future, as the speed of non-volatile memory increases, all the memory may be of the non-volatile type. Digital cameras may also contain a wireless link (120) to the Internet, for example a cell phone.

An image file typically contains more information than just the raw image data. This additional data is typically called meta-data. Most image files also contain the time and date the file was created. Many image files also contain information about the image, for example the resolution of the image, the exposure settings used to capture the image, whether the image has been compressed, and if so how much compression was used. Some cameras contain global positioning systems (GPS, not shown) and include, in the image file, the location the file was created. There are many other types of information that can be included in an image file, for example the names of the people captured in the image may be stored as meta-data.

In one embodiment of the current invention, a digital camera would have access to a database of known faces. The face database may be contained in the memory (108) or storage area (116) of the camera and accessed using the internal bus (122) or the face database may be accessed remotely through a wireless link (for example a cell phone or a radio link). The remote database could also be accessed using an IR link or a cable link (Not shown), for example USB or SCSI. The database of faces would comprise at least the face identification information for a person and the name of the person. The digital camera would first capture an image (202). The image could be a single exposure or it could be a single frame from a video clip. The digital camera would evaluate the image to

determine if any human faces were contained in the captured image (202). If there were human faces detected in the image, the camera would extract the face identifying information from each human face. The camera would then compare the face identifying information with the database of known faces (204). If a face in the image is already in the face database, the name of the person recognized in the image would be added to the meta-data for that image (212). If a face in the image was not already in the database, the user may optionally be asked if the face is to be saved (208). If the face is not to be saved the next face in the image is compared to the database of known faces. If the face is to be saved, the user is prompted to input the person's name (210). The name of the person and the face identification information is added to the database of known faces (218) and the name of the person is added to the meta-data of the image (212).

In another embodiment of the current invention, the user is not prompted to name a person until the person's face has appeared in a preset number of captured images. When a face in an image is not in the database of known faces, the face identifying information is automatically added to the database (314). Each time the face identification information is detected in another image a count is incremented (322). When the count exceeds a predetermined number, the user is then prompted to name the person (318). Once a person in the database of known faces has been named, the name of the person is added to the meta-data of any images containing that person's face (310). The user may adjust the number of times a face needs to appear in an image before the user is prompted to name the person. The user may decide that the person should not be named, even when the face has appeared in the preset number of images.

The digital camera can prompt the user to name a person in a number of ways. The digital camera can display the captured image in the display area and indicate the person to be named. A cursor can be placed below or next to the person to be named to indicate which person in the images needs to be named. An outline can be drawn around the person to be named or a shape can be drawn around the person to be named, for example a box, circle, or oval can be used. The user may name the person using the UI controls or may name the person verbally by speaking the person's name.

In one embodiment of the current invention, the database of known faces is empty when the user buys the camera. The database is built up as the user captures images with people in them and names the people in the images. In another embodiment a new camera is updated with a database of known faces from an older cameras when the user purchases the new camera. In another embodiment of the current invention, the database of known faces is not stored in the camera and the link to the database is transferred from an old camera to the new camera when the user buys a new camera. When the database of known faces is not contained in the camera, multiple cameras may link to the same database, for example when two people in the same family have two cameras, both cameras may be linked to the same database of known faces.

Once the name of the person has been added to the meta-data of the image containing the person, that information can be used to help organize or sort the large number of images created. For example, a user could create a list of all the images that contain "Eric Aas" by sorting the images using the meta-data.

In another embodiment of the current invention, the image file captured is named using the name of the people contained in the image. For example, when "Steven Webb's" face is identified in an image, the image could be named Stevenwebb01.jpg. In another embodiment of the current

invention, a folder or sub-directory would be created for people identified in the images and each image containing those people would be moved or stored in that sub-directory. For example, all the images containing the face of "Steven Webb" would be moved or stored in the directory named StevenWebb. When an image contains multiple people stored in the database of known faces, a copy of the image could be stored in a directory for each person. Or the image could be stored in only one of the directories with a link to the stored image stored in each of the other directories.

In this application the descriptions of the embodiments used a digital camera to capture the image. This invention is not limited to a digital camera. A scanner that creates digital images from hardcopy images can also use the current invention. In fact any device that creates or capture images in digital form can also use the current invention, for example a web cam.

The foregoing description of the present invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and other modifications and variations may be possible in light of the above teachings. For example, this invention is not limited to digital imaging devices, this invention can be used to help name a file created in any manner. The embodiment was chosen and described in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and various modifications as are suited to the particular use contemplated. It is intended that the appended claims be construed to include other alternative embodiments of the invention except insofar as limited by the prior art.

What is claimed is:

1. A digital camera comprising:

- a photo-sensor configured to capture images;
- a storage area configured to store image files;
- a means for accessing a face database, the face database used for storing the names and the face identification information for people;
- a processor configured to evaluate the image files to locate faces;
- the processor configured to match the faces, located by the processor, to the face identification information stored in the face database;
- the processor configured to add the name of a person in the face database to metadata associated with a captured image file in response to matching a face from the captured image file to a face in the face database.

2. A method of naming image files, comprising:

- capturing an image;
- locating at least one face in the image;
- comparing the at least one face in the image to a database of known faces;
- requesting a name for the face when the face does not match any of the known faces in the database;
- storing the face identification information and the name in the database of known faces; and
- storing the image as an image file separate and apart from the face identification information, the image file saved to include the name of at least one person in the image with metadata for the image.

3. A method of naming image files, comprising:

- capturing an image;
- locating at least one face in the image;
- comparing the at least one face in the image to a database of known faces;

5

storing the image as an image file separate and apart from the database of known faces, the image file saved to include the name of at least one person in the image with metadata associated with the image file in response to determining the face matches a face in the face database. 5

4. A method of naming image files, comprising:
 digitizing an image;
 locating at least one face in the image;
 comparing the at least one face in the image to a database of known faces;
 storing the image as an image file separate and apart from the database of known faces, the image file using to include the name of at least one person in the image with metadata associated with the image file when the face matches a face in the face database. 10

5. A digital camera comprising:
 a photo-sensor configured to capture images;
 a storage area configured to store image files;
 a means for accessing a face database, the face database used for storing the names and the face identification information for people; 20
 a processor configured to evaluate the image files to locate faces;
 the processor configured to match the faces, located by the processor, to the face identification information stored in the face database; 25
 the processor configured to save the image files separate and apart from the face database, the image files saved

6

using a name of at least one person in the image when a face in the image files matches a face in the face database; and
 wherein the processor is configured to request a name of a person based on a count being incremented each time face identification information is detected in an image and prompting the user to name the person when the count exceeds the predetermined number.

6. A method of naming image files, comprising:
 capturing an image;
 locating at least one face in the image;
 comparing the at least one face in the image to a database of known faces;
 requesting a name for the face when the face does not match any of the known faces in the database;
 storing the face identification information and the name in the database of known faces; and
 storing the image as an image file separate and apart from the face identification information, the image file saved using the name of at least one person in the image; and
 wherein requesting the name for the face is based on a count being incremented each time face identification information is detected in an image and prompting the user to name the at least one person when the count exceeds the predetermined number.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,064,650 B2
APPLICATION NO. : 10/192922
DATED : November 22, 2011
INVENTOR(S) : Steven L. Webb

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 5, line 12, in Claim 4, delete “using” and insert -- saved --, therefor.

Signed and Sealed this
Fourth Day of September, 2012

A handwritten signature in black ink that reads "David J. Kappos". The signature is written in a cursive style with a large initial 'D' and 'K'.

David J. Kappos
Director of the United States Patent and Trademark Office